

METHODS, SYSTEMS AND COMPUTER PROGRAM PRODUCTS FOR
REQUESTING WIRELESS TELEPHONY APPLICATION (WTA) PROTOCOL
BASED ACTIONS

BACKGROUND OF THE INVENTION

The present invention relates to Wireless Communications and, more particularly, to requesting Wireless Telephony Application (WTA) Protocol based communications.

The desire of individuals to contact others quickly and frequently has been addressed by a variety of telephony functions in the past. For example, a modern phone is typically equipped with a redial function which allows you to call the last person you called by touching a single button. More recently, phones have been equipped with a caller identification (ID) function. This function typically allows the incoming phone number to be displayed on some sort of screen along with some summary information about the incoming phone number, for example, the name of the person who owns the phone, the location of the phone, etc. More advanced versions of the caller ID function may keep a list of all the incoming calls received and allow these calls to be returned by touching a single button. Many modern phones are also equipped with a one touch dialing system in which a phone number may be programmed into a phone and assigned to a particular button on the face of the phone, allowing the user to access the number by touching a single button. Furthermore, many features offered by telephony service providers offer users the opportunity to contact others quickly and frequently. For example, * 69 allows a user to obtain the phone number of the last person that called their telephone number and return the call by pushing a single button on the phone.

Many of these features are useful, for example, for parents seeking to keep track of their children. In this age of mobile phones, pagers, etc. parents may have the ability to contact their children at any time with a touch of a button. Parents may also take advantage of features like caller ID and * 69 to make sure their children are being truthful as to their location. These modern conveniences do have their limits. Often

times a child may not call when he is supposed to or may not answer his phone to avoid speaking with the child's parents. In these situations it may be difficult for a parent to keep track of the child even if the child does have a mobile phone or a pager.

SUMMARY OF THE INVENTION

The present invention provides methods, systems and computer program products for requesting WTA protocol based actions. A request is received for execution of the WTA protocol based action by a target mobile terminal that has a WTA agent. The request may include an identification code that identifies a destination device for the WTA protocol based action. The identification code that identifies the destination device may be associated with a Uniform Resource Locator (URL). A push command including the URL may be generated at a server. The push command is transmitted to the target mobile terminal to initiate the requested WTA protocol based action by the WTA agent of the target mobile terminal. In some embodiments of the invention, the WTA protocol based action may involve initiation of a call from the target mobile terminal to the destination device or repeatedly initiating calls from the target mobile device. Other embodiments need not associate the URL with the identification code. In these embodiments, the WTA protocol based action may involve automatically accepting a call at the target mobile terminal.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of the Wireless Telephony Application (WTA) Protocol architecture.

Figure 2 is a block diagram of embodiments of the present invention implemented in a network environment.

Figure 3 is a block diagram of a mobile terminal according to embodiments of the present invention.

Figure 4 is a block diagram of a system according to embodiments of the present invention.

Figure 5 is a flowchart illustrating operations for requesting WTA protocol based actions according to embodiments of the present invention.

Figure 6 is a flowchart illustrating operations for requesting WTA protocol based actions according to further embodiments of the present invention.

Figure 7 is a flow diagram illustrating operations for requesting WTA protocol based actions according to other embodiments of the present invention.

Figure 8 is a block diagram of a system according to embodiments of the present invention.

Figure 9 is a flowchart illustrating operations for requesting WTA protocol based actions according to embodiments of the present invention.

Figure 10 is a flowchart illustrating operations for requesting WTA protocol based actions according to further embodiments of the present invention.

Figure 11 is a flow diagram illustrating operations for requesting WTA protocol based actions according to other embodiments of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which illustrative embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

As will be appreciated by one of skill in the art, the present invention may be embodied as a method, system, or computer program product. Accordingly, the present invention may take the form of an entirely hardware embodiment, an entirely software embodiment or an embodiment combining software and hardware aspects. Furthermore, the present invention may take the form of a computer program product on a computer-usable storage medium having computer-usable program code means embodied in the medium. Any suitable computer readable medium may be utilized including hard disks, CD-ROMs, optical storage devices, a transmission media, such as those supporting the Internet or an intranet, or magnetic storage devices.

Computer program code for carrying out operations of the present invention may be written in an object oriented programming language such as Java®, Smalltalk or C++. However, the computer program code for carrying out operations of the present invention may also be written in conventional procedural programming languages, such as the "C" programming language. The program code may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or

entirely on the remote computer. In the latter scenario, the remote computer may be connected to the user's computer through a local area network (LAN) or a wide area network (WAN), or the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider).

The present invention is described below with reference to flowchart illustrations and/or block diagrams of methods, apparatus (systems) and computer program products according to embodiments of the invention. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions or acts specified in the flowchart and/or block diagram block or blocks.

These computer program instructions may also be stored in a computer-readable memory that can direct a computer or other programmable data processing apparatus to function in a particular manner, such that the instructions stored in the computer-readable memory produce an article of manufacture including instruction means which implement the function or act specified in the flowchart and/or block diagram block or blocks.

The computer program instructions may also be loaded onto a computer or other programmable data processing apparatus to cause a series of operational steps to be performed on the computer or other programmable apparatus to produce a computer implemented process such that the instructions which execute on the computer or other programmable apparatus provide steps for implementing the functions or acts specified in the flowchart and/or block diagram block or blocks.

By way of background to understanding the present invention, **Figure 1** is a block diagram which illustrates the Wireless Telephony Application (WTA) Protocol architecture. The architecture **100** includes a mobile terminal **110**, a mobile network **120**, a Wireless Application Protocol (WAP) gateway **130**, and a WTA server **140**. For the illustrated embodiments, a WTA server **140** is coupled to the wireless network **120**, such as a cellular telecommunications network, through the WAP gateway **130**. A mobile terminal **110** communicates over a wireless connection to the wireless

network **120**. Thus, the wireless network **120** may provide a connection between the mobile terminal **110** and the WTA server **140** through the WAP gateway **130**.

WTA provides an application framework for telephony services. The WTA framework may support Wireless Telephony Applications that interface with device specific features **160** located within the mobile terminal **110** and the network telephony infrastructure (network layer **170**). As shown in **Figure 1**, the mobile terminal **110** is typically equipped with a dedicated WTA user-agent **150**. The WTA user-agent **150** may retrieve content from a repository **155** and Wireless Telephony Application Interface (WTAI) **165** Libraries. The WTAI **165** libraries may contain functions which may provide the WTA user-agent **150** access to device specific functions **160**, such as a phonebook, and/or to mobile network functions, such as setting up calls (network layer **170**). The mobile terminal **110** may also be equipped with the standard devices such as a Man Machine Interface (MMI) **115** which may include, for example, a keyboard, a display, etc.

WAP is generally a specialized application protocol that has been tailored for small handheld communication devices, like cellular phones, that may have limited keypad entry and display capabilities. WAP defines a set of protocols in the transport, session and application layers of a protocol stack. The WTA utilities of WAP may provide the additional capabilities for interfacing with mobile network services available to a mobile telephony device, such as setting up and receiving (accepting) telephone calls. These additional capabilities typically utilize the WTA user-agent **150**. The standard user-agent (Wireless Application Environment (WAE) user-agent) may be capable of interfacing with WTAI **165** public library functions, such as the ability to place a call, but does not generally allow full featured telephony control. Typically, only the WTA user-agent is able to fully control the telephony features of a mobile telephony device, such as a mobile terminal **110**. For example, the WAE user-agent may not be able to receive and react to telephony and network text events. The WAE user-agent may only retrieve its content through the WAP gateway **130** and may only have access to the WTAI **165** public library functions. As stated above, the WTA user-agent **150** generally may retrieve content from the repository **155** and has access to all WTAI **165** libraries, both public and private.

The WAP Gateway **130** may be used to translate WAP messages into other protocols so that the WAP messages may be accessible to other types of applications. The WTA server **140** may communicate with the mobile network **120** through the

WAP gateway **130**. The WTA Server **140** may be a web server that may deliver content requested by a WTA equipped mobile terminal **110**. A WTA user-agent **150** may use Uniform Resource Locators (URLs) to reference content on the WTA server **140**. A URL may also be used to reference an application on a web server that is executed when referenced. Such applications may be programmed to perform a wide range of tasks. Referencing these applications on the WTA server **140** may make it possible to create services that use URLs to interact with the mobile network **120** and other entities.

Referring now to **Figure 2**, a block diagram of embodiments of the present invention implemented in a network environment will be described. The network **200** may include a mobile terminal **250**, a wireless network **240**, a WAP Gateway **230**, a server **220** and a request center **210**. The server **220** may communicate with a wireless network **240** over the wireless connection through the WAP gateway. The mobile terminal **250** may communicate over a wireless connection of the wireless network **240**. Thus, the wireless network **240** may provide a connection between the mobile terminal **250** and the server **220** through the WAP gateway **230**.

The network as illustrated in **Figure 2**, also includes a request center **210**. This request center **210** may be a customer service center or the like. This request center **210** may communicate user requests to the server **220**. The server **220** may include a WTA server **140**, as discussed above, or a general applications server. The type of server employed may be determined by the type of function requested. For example, if the function requested may be accessed in the WTAI **165** public library, as discussed above, then a general applications server may be used. If, on the other hand, the function requires access to one of the WTAI **165** private libraries a WTA server **140** may be used.

Once the request has been processed by the server **220**, the server **220** may communicate the request over a wireless connection of the wireless network **240** through the WAP gateway **230**. The WAP gateway, as discussed above, may translate WAP messages into the protocol (language) of the receiving device. The mobile terminal **250** may receive the request from the wireless network **240** over a wireless connection. If the request requires the mobile terminal **250** to perform some function, the mobile terminal **250** may perform the requested function responsive to the request. The type of functions that may be requested may include, for example, initiating a phone call from the target mobile terminal, accepting a call at the target

mobile terminal, providing a location responsive to the Global Positioning System (GPS) 260 functionality of the mobile terminal 250 and/or providing a digital image responsive to a camera circuit 270 associated with the mobile terminal 250.

Figure 3 illustrates an exemplary mobile terminal 300, such as a wireless mobile terminal, according to embodiments of the present invention. The mobile terminal 300 may include, in a housing 301, a transceiver (*i.e.*, receiver and transmitter) 372 that is operative to transmit and receive RF communication signals via an antenna 310 under control of a controller 370. The controller 370 may include a speech/data processing circuit 376 as well as other functional modules not illustrated in **Figure 3** but which will be understood to those of skill in the art related to wireless communications including both data and voice communication support. As used herein, the speech/data processing circuit 376 may include components such as demodulators, decoders, interleavers and RF processor circuitry.

The controller 370, such as a microprocessor, microcontroller or similar data processing device, may execute program instructions stored in a memory 360 of the mobile terminal 300, such as a dynamic random access memory (DRAM), electrically erasable programmable read-only memory (EEPROM) or other storage device. The controller 370 is further operatively associated with user interface components of the mobile terminal 300 such as a display 320, a keypad 330, a speaker 340, and a microphone 350, operations of which are known to those of skill in the art and will not be further discussed herein.

The transceiver 372 may provide a communication circuit including a receiver that receives wireless communications 382 from a server, such as the WTA server 140, and may further receive location system signals from a land based system or from GPS satellites. The transceiver 372 may further operate to provide such signals from the location system to the positioning circuit 373 and from the server to the I/O circuit 374.

The positioning circuit 373 is configured to determine a location of the mobile terminal. The positioning circuit 373 may determine a location of the mobile terminal 300, for example, using signals from GPS satellites. In alternative embodiments, a land based automated positioning system configured to determine the location of the mobile terminal based on wireless communications between the mobile terminal 300 and the land based automated positioning system may be utilized by the positioning circuit 373 to allow the mobile terminal 300 to determine its location. It is to be

understood that, as used herein, "GPS" is intended to encompass not only the United States satellite based system commonly using such designation but similar systems, such as Glonass, or other subsequently developed satellite based location systems. Furthermore, as used herein, "land based automated positioning system" is intended to encompass hybrid systems including satellite components.

The digital camera circuit **375**, in cooperation with the I/O circuit **374** and the transceiver **372**, may be configured to transmit data such as a digital photograph to the server over a connection between the mobile terminal **300** and the server. The I/O circuit **374**, in cooperation with the transceiver **372**, may be further configured to communicate with a WTA user-agent **377** having access to a repository **379** and WTAI libraries **378**. The I/O circuit **374** may be further configured to receive information from the server for the WTA user-agent **377** and transmit information from the WTA user-agent **377** to the server.

It will be appreciated that the transceiver **372**, the speech/data processing circuit **376** and other components of the mobile terminal **300** may be implemented using a variety of hardware and software. For example, operations of the transceiver **372** and/or the speech/data processing circuit **376** may be implemented using special-purpose hardware, such as an application specific integrated circuit (ASIC) and programmable logic devices such as gate arrays, and/or software or firmware running on a computing device such as a microprocessor, microcontroller or digital signal processor (DSP). It will also be appreciated that, although functions of the transceiver **372** and the other circuits shown in **Figure 3** may be integrated in a single device, such as a single ASIC microprocessor, they may also be distributed among several devices. Aspects of these circuits may also be combined in one or more devices, such as an ASIC, DSP, microprocessor or microcontroller. These various implementations using hardware, software, or a combination of hardware and software will generally be referred to herein as "circuits."

The present invention will now be further described with reference to the block diagram of **Figure 4** which illustrates a system **400** according to embodiments of the present invention. As illustrated in **Figure 4**, the system includes a server **430** which includes an applications server **434**, a push application **436** and an association application **432**. Although the server **430** is shown as one physical component made up of three internal applications **432**, **434**, and **436** in **Figure 4**, it will be understood by those having skill in the art that this arrangement is for exemplary purposes only

and that many configurations may be employed. For example, two physically separate servers may be employed, a WTA server and an applications server, each having their respective functions and applications **432** and **436** can be combined with the applications server **434**.

The applications server **434** may receive a request for a WTA protocol based action by a target mobile terminal. The request may arrive from one of many sources, for example, from a mobile terminal, from a Public Switched Telephone Network (PSTN) phone, from a source on the internet, or the like. In embodiments of the present invention the request may be to initiate a call from a target mobile terminal to another mobile terminal or other destination device. If this is the case, the request may include the contact number of the target mobile terminal and the identification code that identifies the destination device. The identification code that identifies the destination device may be the contact number of the destination device. These contact numbers may be mobile telephone numbers, PSTN telephone numbers, or the like. In other embodiments the request may be for repeatedly calling the destination device. If this is the case, the request may also include a start time of the first call, an interval that specifies when the subsequent calls are to occur, and an indication of when the calls should terminate. This information may be processed by the applications server **434**. The applications server **434** may contain computer programs that may be used to process the request and a memory **446** for storage of URLs and scripts.

Typically it is desirable to have a secure relationship between the device that makes the request and the server **434**. This may be provided by limiting access to the means of requesting the WTA protocol based action by the target mobile terminal. The processes for securing a connection in a wireless network are known to those of skill in the art and will not be discussed further herein.

The association application **432** may create a unique association of the contact number (identification code) that identifies the destination device **442** with a Uniform Resource Locator (URL) **441**. This unique association may be used by the target mobile terminal to initiate contact with the destination device. The URL **441** may, for example, reference a script that triggers a make call process in the WTA user-agent **454** of the target mobile terminal **450**. The make call process may be located in the WTAI public library **452**. Where the make call process is in the WTAI public library

452 the WTA server need not be used to access this function, the make call function may, alternatively, be accessed by a general applications server 434.

The start time of the first call, an interval that specifies when the subsequent calls should occur, and the indication of when the calls should terminate may be processed by the applications server 434. The applications server 434 may contain the timer 445 and the ability to perform these functions. The push application 436 creates the push command 447 that is typically needed to initiate the make call process. The push command may contain the URL as described above.

When the timer 445 reaches the start time indicated in the request for the WTA protocol based action, the applications server 434 may trigger the transmission of the push command 447, previously created by the push application 436, including the URL associated with the identification code that identifies the destination device. The push command may be transmitted to the WTA agent 454 of the target mobile terminal 450. The WTA user-agent may use the URL to reference the make call function in the WTAI public library 452. This is the same URL that has been associated with the identification code of the destination device, therefore the WTA user-agent 454 may initiate a call from the target mobile terminal 450 to the destination device. The communication between the server 430 and the mobile terminal 450 may be through the mobile network 410 via the WAP gateway 420 although it is shown as direct in **Figure 4** to simplify the illustration.

Operations according to embodiments of the present invention for requesting WTA protocol based actions will now be further described with reference to the flow chart illustration of **Figure 5**. Operations begin at block 500 with receipt of a request for execution of the WTA protocol based action by a target mobile terminal having a WTA user-agent. This request may be received, for example, from a mobile terminal, a PSTN phone, a source on the internet, or the like. In embodiments of the present invention the WTA protocol based action may be the initiation of a call from the target mobile terminal to the destination device. If this is the case, the request may include the identification code of the destination device and a contact number of the target mobile terminal. The identification code of the destination device may be the contact number of the destination device. The WTA protocol based action may also be for successive initiations of calls from the target mobile terminal to the destination device. If this is the case, the request may further include a start time for the first call, an interval on which the calls should execute, and an indication of when execution of

the calls should terminate. The interval may be a periodic interval but does not have to be periodic. The interval may be specified by the request for execution of the WTA protocol based action. The indication of when execution of the calls should terminate may be in the form of a stop time, a number of calls to be made, or other interval specification.

A server receiving a request for execution of the WTA protocol based action by a target mobile terminal may associate a Uniform Resource Locator (URL) with the identification code that identifies the destination device (block 510). As discussed above, this is a unique association that may be used by the target mobile terminal to initiate contact with the destination device. The URL may reference a script that triggers a make call process in the WTA user-agent 454 of the target mobile terminal 450. The make call process may be located in the WTAI public library 452. The fact that the make call process is provided in the WTAI public library 452 may allow the make call function to be accessed by a general applications server not just a WTA server. Accordingly, the applications server 434 may be a WTA server, a general applications server, or the applications server may be incorporated into the WTA server.

A push command, including the associated URL, is generated at the server (block 520). The push command may further include a pointer to a Push Proxy Gateway (PPG) of the target mobile terminal, an identifier of a contact number of the target mobile terminal, and a pointer to the WTA user agent of the target mobile terminal. The push command may be transmitted to the target mobile terminal to initiate the requested WTA protocol based action by the WTA agent of the target mobile terminal (block 530). If, as discussed above, the WTA protocol based action is successive initiations of calls from the target mobile terminal to the destination device, the push command may be repeatedly transmitted according to the interval specified by the request for execution of the WTA protocol based action.

Operations according to embodiments of the present invention for requesting WTA protocol based actions, and in particular for transmitting a push command, will now be further described with reference to the flow chart illustration of **Figure 6**. Operations begin at block 600 with receipt of a request for execution of the WTA protocol based action by a target mobile terminal having a WTA user-agent. A server receiving a request for execution of the WTA protocol based action by a target mobile terminal may associate a URL with the identification code that identifies the

destination device (block **610**). A push command including the associated URL is generated at the server (block **620**). The details associated with blocks **600 - 620** are discussed in above with respect to blocks **500 - 520** of **Figure 5**.

It is determined if the start time included in the request discussed above has arrived (block **625**). If the start time has not arrived operations may remain at block **625** until the start time does arrive. If the start time has arrived, the push command, including the URL, is transmitted to the Push Proxy Gateway (PPG) of the target mobile terminal identified in the push command (block **630**). The PPG may be located within the WAP Gateway. The PPG initiates an authentication between the server and the target mobile terminal (block **632**). This may ensure that the appropriate security is in place to guarantee that the push command is from a trusted source.

The PPG determines if a Wireless Application Protocol (WAP) session has been initiated (block **634**). If a WAP session has not been initiated, the PPG may initiate the WAP session (block **636**). The PPG may initiate the WAP session by sending a Session Initiation Application (SIA) to the WTA user-agent of the target mobile terminal and the WTA agent may initiate the WAP session in response to the SIA. If the WAP session is already in progress (block **634**), operations may proceed to block **638** where the PPG may transmit a Service Load (SL) push command including the URL to the WTA user agent of the target mobile terminal using the WAP session. The URL may be accessed by the WTA user-agent (block **640**). As discussed above, the URL is associated with a script that executes a make call command associated with the WTAI public library. The target mobile terminal may initiate a call from the target mobile terminal to the destination device (block **650**).

It is determined if an indication of termination has been identified (block **660**). As discussed above, an indication of termination may be in the form of a stop time or a maximum number of calls to be made. If the stop time has arrived or the maximum number of calls has been reached, an indication of termination may have been identified and operations may be terminated. If an indication of termination has not been identified, operations may return to block **625** and repeat until an indication of termination is identified.

Operations according to embodiments of the present invention for requesting Wireless Telephony Application (WTA) protocol based actions are further illustrated in the flow diagram of **Figure 7**. The flow diagram illustrates operations of

embodiments of the present invention from receiving a request for WTA protocol based action through initiating the of the WTA protocol based action. The details of each of the steps illustrated in the flow diagram of **Figure 7** correspond to those described above with reference to **Figures 5** and **6**. **Figure 7** also illustrates a user confirmation and a push setup confirmation not described above with respect to **Figures 5** and **6**. These confirmations are optional as indicated in **Figure 7** and will not be discussed further herein.

Other embodiments of the present invention will now be described with reference to the block diagram of **Figure 8** which illustrates a system **800** according to embodiments of the present invention. As illustrated in **Figure 8**, the system includes a server **830** which includes an applications server **834** and a WTA server **836**. Although the server **830** is shown as one physical component made up two internal servers **834** and **836**, it will be understood by those having skill in the art that this is for exemplary purposes only and that many configurations may be employed. For example, two physically separate servers may be employed, a WTA server and an applications server, each having their respective functions. Alternatively, the applications server may be part of the request center (Customer Service Center (CSC)) **820** or part of the WTA server **836**.

A user may send a request for a WTA protocol based action by a target mobile terminal to the CSC **820**. The request may arrive from many sources, for example, from a mobile terminal, from a Public Switched Telephone Network (PSTN) phone, a source on the internet, or the like. The request may be for automatically accepting a call at the target mobile terminal, i.e. accepting a call without user intervention. If this is the case, the request may include the contact number of the target mobile terminal. This contact number may be a mobile telephone number, PSTN telephone number, or the like. This information may be processed by the applications server (receiving server) **834**. The applications server **834** may contain computer programs **845** that may be used to process the request and coordinate the accepting of a call by the target mobile terminal and a memory **846** that may be used to store the information contained in the request. The coordination may involve requesting the call when the mobile terminal **850** is prepared to accept the call, as will be discussed further for various embodiments below with respect to **Figures 9** and **10**.

It may be desirable to have a secure relationship between the device that makes the request and the server **830**. This may be provided by limiting access to the

means of requesting the WTA protocol based action by the target mobile terminal. Process for securing a connection in a wireless network are known to those of skill in the art and will not be further discussed herein.

The applications server **834** may coordinate with the WTA server **836** to create a push command. The push application **847** of the WTA server **836** creates a push command, for example, to accept call. The accept call process may be located in the WTAI private library **852**. The fact that the accept call process is in the WTAI private library **852** may require that a WTA server be used to access this function where the accept call function is restricted to only being accessed by the WTA server **836**. The push application **847** transmits the push command to the WTA user-agent **854** of the target mobile terminal **850** identified by the target mobile terminal contact number in the request.

The WTA server **836** notifies the CSC **820** using the notification application **848** that the push command has been sent to the WTA user-agent **854** of the mobile terminal **850**. The CSC **820** initiates a call to the target mobile terminal **850** using the contact number provided in the request. The initiation of the call in the CSC **820** may be performed automatically by the applications server **834** or may be performed manually by a Customer Service Representative who may be notified by the applications server **834** to initiate the call to the target mobile terminal. The target mobile terminal **850** may then automatically answer the call from the CSC **820** without any user intervention. The communication between the server **830** and the mobile terminal **850** may be through the mobile network **810** via the WAP gateway although it is shown as direct in **Figure 8** to simplify the illustration.

Operations according to embodiments of the present invention for requesting WTA protocol based actions will now be further described with reference to the flow chart illustration of **Figure 9**. Operations begin at block **900** with receipt of a request from a request center for execution of the WTA protocol based action by a target mobile terminal having a WTA user-agent. This request may be received, for example, from a mobile terminal, a PSTN phone, a source on the internet or the like. In embodiments of the present invention, the WTA protocol based action may be automatically, without any user intervention, accepting a call at the target mobile terminal. If this is the case, the request may include the contact number of the target mobile terminal. The request center may be a customer service center (CSC) that has access to an applications server. The applications server may be part of the CSC, a

separate component, or a part of the WTA server. The applications server may receive the request for execution of the WTA protocol based action and forward the request to the WTA server.

The WTA server may generate a push command selecting a state of the target mobile terminal based on the requested WTA protocol based action (block **910**). In some embodiments of the present invention, the state of the target mobile terminal may be an accept call state. The accept call state may be activated by an accept call command located in the Wireless Telephony Application Interface (WTAI) private library.

The WTA server transmits the push command to the WTA agent of the target mobile terminal (block **920**) and notifies the request center (CSC) that the push command has been transmitted to the WTA agent of the target mobile terminal (block **930**). A communication is initiated between the target mobile terminal and the CSC (block **940**). The communication may be initiated by an application executing on an applications server or performed by a user at the request center responsive to a notification generated by an application executing on the applications server that indicates to the user that the communication should be initiated. The WTA protocol based action may be initiated at the target mobile terminal in response to the communication from the request center to the target mobile terminal (block **950**).

Operations according to embodiments of the present invention for requesting WTA protocol based action will now be further described with reference to the flowchart illustration of **Figure 10**. Operations begin at block **1000** with receipt of a request from a request center for execution of the WTA protocol based action by a target mobile terminal having a WTA user-agent. The WTA server may generate a push command selecting a state of the target mobile terminal based on the requested WTA protocol based action (block **1010**). The details associated with blocks **1000** and **1010** are discussed above with respect to blocks **900** and **910** of **Figure 9**. As shown in **Figure 10**, an authentication may be initiated between the WTA server and the target mobile terminal (block **1020**). This may ensure that the appropriate security is in place to guarantee that the Push command is from a trusted source.

It is determined if a WAP session has been initiated (block **1030**). If a WAP session has not been initiated, a WAP session is initiated (block **1040**). The WAP session may be initiated by sending a Session Initiation Application (SIA) to the

WTA user-agent of the target mobile terminal and the WTA agent initiates the WAP session in response to the SIA.

If the WAP session is already in progress, operations proceed to block **1050**. The WTA server transmits the Push command as discussed above (block **1050**). The WTA server transmits a Service Load (SL) push command to the WTA user agent of the target mobile terminal using the WAP session (block **1060**). The SL push may include a URL. The URL is accessed by the WTA agent (block **1070**). The URL may be associated with a script that executes an accept call command. The accept call command may be associated with a WTAI private library.

The WTA server notifies the request center (CSC) that the push command has been transmitted to the WTA agent of the target mobile terminal (block **1080**). A communication is initiated between the target mobile terminal and the CSC (block **1090**). Typically it is desirable to synchronize the events that take place between the CSC and the target mobile terminal. The processes for synchronizing events in a wireless network are known to those of skill in the art and will not be discussed further herein. The WTA protocol based action may be initiated at the target mobile terminal in response to the communication from the request center to the target mobile terminal (block **1095**). Operations associated with blocks **1080** and **1095** are generally discussed above with respect to blocks **930** through **950** of **Figure 9**.

The CSC may obtain information from the target mobile (block **1097**). This information may be positioning information provided by a Global Positioning System (GPS) or a land based automated positioning system associated with the target mobile terminal, an image provided by a digital camera device associated with the target mobile terminal, and/or any combination thereof.

Operations according to embodiments of the present invention for requesting WTA protocol based actions are further illustrated in the flow diagram of **Figure 11**. The flow diagram illustrates operations of embodiments of the present invention from receiving a request for WTA protocol based action to initiating the of the WTA protocol based action. The details of each of the steps in the flow diagram of **Figure 11** correspond to the description above with reference to **Figures 9** and **10**.

Operations of the present invention have been described with respect to the block diagram illustration of **Figures 1** through **4** and **8** and the flowchart illustrations of **Figures 5** through **7** and **9** through **11**. It will be understood that each block of the flowchart illustrations and the block diagram illustrations of **Figures 1** through **11**,

and combinations of blocks in the flowchart illustrations and the block diagram illustrations, can be implemented by computer program instructions. These program instructions may be provided to a processor to produce a machine, such that the instructions which execute on the processor create means for implementing the functions specified in the flowchart and block diagram block or blocks. The computer program instructions may be executed by a processor to cause a series of operational steps to be performed by the processor to produce a computer implemented process such that the instructions which execute on the processor provide steps for implementing the functions specified in the flowchart and block diagram block or blocks.

Accordingly, blocks of the flowchart illustrations and the block diagrams support combinations of means for performing the specified functions, combinations of steps for performing the specified functions and program instruction means for performing the specified functions. It will also be understood that each block of the flowchart illustrations and block diagrams, and combinations of blocks in the flowchart illustrations and block diagrams, can be implemented by special purpose hardware-based systems which perform the specified functions or steps, or combinations of special purpose hardware and computer instructions. For example, the I/O circuit 374 may be implemented as code executing on a processor, as integrated circuit devices, such as signal processors or custom chips, or as a combination of the above.

The flowcharts and block diagrams of **Figures 1** through **11** illustrate the architecture, functionality, and operation of possible implementations of systems, methods and computer program products for requesting Wireless Telephony Application (WTA) Protocol based actions according to various embodiments of the present invention. In this regard, each block in the flow charts or block diagrams may represent a module, segment, or portion of code, which comprises one or more executable instructions for implementing the specified logical function(s). It should also be noted that, in some alternative implementations, the functions noted in the blocks may occur out of the order noted in the figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved.

In the drawings and specification, there have been disclosed typical illustrative embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being set forth in the following claims.